Annex 1: Other interesting Member State/technology examples of successful penetration

Denmark — Biomass power

Denmark has a good record of utilising its biomass resources, especially for heating purposes. More recently, biomass has increasingly been used to generate power as well.

In 1993:	167.0 GWh
In 1999:	483.0 GWh
Increase 1993–99:	316.0 GWh, 189 %

Community heating systems are common in Denmark, and biomass is often used as a fuel for them. These systems may be heat only, but increasingly they are being converted or developed to operate as combined heat and power (CHP) systems, with power exported to the grid.

The Masnedø CHP plant produces heat for Vordingborg's district heating network and electricity for eastern Denmark's grid. The plant has a capacity of 8.3 MW of electricity and 20.8 MW of heat. It went into operation in 1996 as one of 10 small-scale CHP plants in eastern Denmark which use indigenous fuels: straw, wood (wood chips), waste and natural gas. The Masnedø CHP plant consumes 62,000 tonnes straw annually, together with natural gas. Wood chips can replace part of the straw if needed.

Success factors:

- ***Political: Denmark has a national energy plan with targets for increased use of biomass***

The Danish government has implemented a series of energy action plans, the most recent being the current plan Energy 21, launched in 1996. This plan is consistent with the overall national objective of a 20 % reduction in CO_2 emissions from 1988 levels by 2005. The plan proposes to increase the use of biomass for energy from 1 250 ktoe per year in 1995 to 2 000 ktoe per year by 2005. One of the main initiatives is to increase the use of biomass in power production, partly through the conversion of biomass in heating-only plants to biomass in CHP, and partly by the development of biomass CHP for smaller district heating plants.

- ***Legislative: Premium-set tariffs combined with an obligation to purchase provide a stable market to renewable electricity producers***

Electricity from biomass is sold to the local utility under a feed-in law, in operation since 1992, which guarantees a commercially favourable fixed tariff and market for electricity generated from renewable energy sources.

Utilities are obliged to purchase and distribute electricity produced from biomass sources. The producer pays the cost of grid connection, whilst the transmission company pays for the necessary reinforcement and extension of the network. Prices available vary depending on the time of day and whether the producer is a private company or a utility, and are enhanced through 'reimbursements' of CO_2 tax (see below) and government subsidy. In 1998, the average price, including the feed-in tariff, the CO_2 tax reimbursement and the subsidy, available for private company biomass energy projects was DKK 0.54/kWh (EUR 0.073/kWh). Local power distribution companies are also obliged to provide grid connection for proposed renewable energy projects.

The increase in CHP installations, although significant, has not been as rapid as was expected, however, because prices have not been increased since the early 1990s. A number of the older plants have experienced economic difficulties, and fewer new plants are coming on line than had been anticipated because the prices are no longer attractive. Reforms of the electricity

industry currently being implemented will alter this situation, through changes to feed-in tariffs and rules for electricity from renewable energy sources.

Under a 1993 Biomass Agreement, utilities are also required to use an increasing proportion of straw and wood chips as fuel in their power installations. The Biomass Agreement was amended in 1997 to allow utilities greater flexibility in the choice of biomass procured.

- ***Fiscal: Biomass power benefits from favourable taxation***

One component of the beneficial tariffs available for renewable energy projects, including biomass, is a subsidy through the CO_2 tax. This is worth DKK 0.1/kWh (EUR 0.013/kWh). Biomass power is, however, subject to SO_2 tax (with some compensatory refunds, depending on the size and type of the project).

- ***Financial: A wide range of subsidies and grants are available for the biomass sector***

A range of economic incentives is available for the development of biomass projects. These include a fund established in 1992 to support the conversion of district heating plants to biomass-fired CHP plants, which provide 10–25 % of the costs of conversion. Other support is given as subsidies towards the construction of renewable energy projects (up to 30 %), towards demonstration projects and to support the dissemination of commercially available technologies.

Denmark — Wind energy

Denmark has led the way in exploiting wind energy over the past 20 years, and until the mid-1990s had the greatest use of wind energy in Europe.

In 1993:	1 034.2 GWh
In 1999:	3 029.0 GWh
Increase 1993–99:	1 994.8 GWh, 193 %

Many of the wind power installations in Denmark have been developed through the cooperative system, or by local farmers or groups of individuals wishing to develop their own renewable energy power systems. Many of the original turbines are now being updated or replaced with larger machines.

One example is the Avedøre wind energy cooperative, which was established in 1993. Twelve turbines, each of 300-kW capacity, were developed, six of which are owned by the local utility and the other six by a cooperative of citizens from Copenhagen. The wind energy cooperative organised the project and offered Copenhagen citizens the opportunity to become shareholders. The scheme has been successful and has been replicated across the country.

Success factors:

- ***Political: Long-established political support towards renewable energy development***

Danish energy policy seeks to replace electricity produced from coal with that from CHP, natural gas and renewable energy. Throughout the 1990s, a series of energy strategies has progressively raised the targets for renewable energy use. The most recent (1996) strategy, Energy 21, set a target of 1 500 MW of wind turbines by 2005. This target was exceeded in 1999. The government now intends to provide 50 % of Danish electricity consumption from renewables by 2030. A large part of this will come from on and offshore wind power.

- ***Legislative: Premium-set tariffs combined with an obligation to purchase provide a stable, commercially favourable market to renewable electricity producers***

The feed-in law has been an important influence in the development of wind energy projects in Denmark. Electricity from wind farms is sold to the local utility under a feed-in law, in operation since 1992, which guarantees a commercially favourable fixed tariff and market for electricity generated from renewable energy sources. The local utility is obliged to take all the output from the plant. Prices available vary depending on whether the producer is a private company or a utility, and are enhanced by 'reimbursements' of CO_2 tax (see below) and government subsidy. In 1998, private and decentralised electricity producers received an incentive of DKK 0.17/kWh (EUR 0.022/kWh), and all renewable producers (including utility companies) received an additional DKK 0.10/kWh (EUR 0.013/kWh) as an internalisation of the external costs of fossil fuels (CO_2 tax). A new pricing system was introduced in the year 2000 with the Danish electricity reform and after a transition period of 5 to 10 years, all wind power producers will receive only the market price and green certificates.

- ***Financial: Subsidies were available to establish a strong domestic wind energy market***

The Danish government provided subsidies of up to 30 % towards wind turbine installation costs, although these were discontinued in 1989. This early support helped to establish a strong home market and associated indigenous industry.

Grants for replacement of old wind turbines are also available.

- ***Fiscal: Taxation is favourable towards renewable energy***

A CO_2 tax is levied on electricity production from fossil sources. Renewable energy receives compensation from this, in order to internalise the external costs of fossil fuels (see above).

For cooperative operations, no income tax is payable on dividends up to DKK 3 000 (EUR 400).

- ***Administration: Positive municipal support combined with active involvement of local utility***

The long history of using wind as an energy resource has created a favourable environment within the administration for further wind developments. For example, the Avedøre wind energy cooperative project benefited greatly from the positive attitude of the local municipality and the joint development of the project with the local utility. These factors contributed to the simplification of many planning, infrastructure and quality issues.

Since 1996, in order to enlarge the potential of suitable sites, municipalities have been required to submit proposals for wind turbine capacity and to thus make wind turbine development a regular feature of their planning.

- ***Technological development: Early government support helped establish a strong indigenous wind energy manufacturing industry***

During the late 1980s the Danish government provided financial support to development projects in the emerging Danish wind energy industry which is now the strongest in Europe, with successful domestic and worldwide export sales.

Domestic wind developments (such as the Avedøre scheme) benefit from this success by having ready access to high-quality Danish turbines, components, sales and service.

Some subsidies are still available from research funds, including the programme for new renewable energy technologies, which supports non-commercially sustainable renewable energy technologies, including wind, and the energy research programme, which supports the implementation of Danish energy policy.

- ***Information, education and training: High level of public awareness of environmental issues combined with traditional Danish approach of forming cooperatives***

The concept of cooperatives is well established in Denmark: dairy and other farming cooperatives have been operating for over a century. It has therefore been relatively straightforward to transfer the cooperative concept to the newly emerging wind industry. The Danish Wind Turbine Manufacturers Association has been actively supporting uptake of wind energy for nearly 20 years and offers a high level of support and education to prospective developers, especially farmers and other individuals wishing to develop wind energy schemes.

In addition, there is a high level of environmental awareness among Danish citizens, who see renewable energy as a safe and clean energy supply option. This supportive attitude has helped to raise interest in the environmental benefits offered by renewable energy sources.

Finland — Biomass power

Finland is one of the leading European countries in the use of renewable energy, in particular through its extensive biomass resources.

In 1993:	5 644.0 GWh
In 1999:	8 341.0 GWh
Increase 1993–99:	2 697.0 GWh , 47 %

Combined heat and power (CHP) is used extensively in Finland to provide both heat and electricity for domestic and industrial purposes. CHP plants make use of a range of biomass resources, burning wood waste and agricultural biomass, as well as peat and black liquor. Much of the biomass resource is derived from Finland's pulp and paper industries, which account for about half the country's industrial energy consumption. There is also a well-developed biomass supply industry. District heating systems are also common, with about half the population connected to a district heating network. These are increasingly using biomass as fuel, as well as coal and natural gas.

The Forssa biomass plant is the first CHP district heating plant in Finland fuelled entirely by wood. The plant's boiler is specially adapted for the use of solid biofuels and other biomass fuels. The plant can generate up to 66 MW heat, and started operating in September 1996. The plant produces all the heat and one third of the electrical power required by the city of Forssa for almost the whole year.

Success factors:

- ***Political: Finland has an energy strategy that supports the development of renewable energy, especially biomass***

Finland's national biomass strategy was launched in 1994 and aimed to increase biomass use by 25 % (1.5 mtoe) by 2005 from the 1992 level. The Finnish energy strategy is to continue to expand the use of wood and other renewable energy resources, both to help meet Finland's Kyoto targets and to contribute towards the security of Finnish energy supply. An action plan for renewable energy sources was launched in 1999 and has the objective of increasing the use of renewable energy, including biomass, by 50 % from the 1995 level, when renewable energy contributed over 20 % of total primary energy demand, by 2010.

Energy planning is actively supported at regional and local levels, with regional strategies updated regularly.

- ***Legislative: Transmission costs are fixed, and grid access is open to all producers***

Liberalisation of the electricity market in Finland started in 1995, and included opening grid access to all producers and consumers. The cost of transmission is fixed by law, ensuring transparency and predictability to producers.

- ***Fiscal: Economic support measures act in favour of renewables compared with fossil fuels***

Fiscal measures and research and development (R&D) are two central policy approaches used to support market deployment and commercialisation of renewable energy in Finland.

In 1990 Finland introduced a CO_2 tax on fossil fuels, which was replaced by a combined CO_2 and energy tax in 1994, based on the carbon and energy content of the fuel. Renewable energy was exempted from the tax.

In 1997 this tax was replaced by taxation on electricity at the distribution level, with a refund granted to electricity from renewable sources (EUR 0.042/kWh for biomass). The heat production tax was retained.

Small-scale (less than 1 MW) biomass plants also benefit from a reduction of value-added taxes payable on the plant.

- ***Financial: Subsidies are available on investments and equipment relating to renewable energy production and use***

Public funding is important to support the building of new renewable energy plants and is made available through national, regional or local subsidies. National government subsidies of up to 30 % of the investment costs are available to renewable energy technologies, including biomass.

- ***Technological development: Extensive research and development capabilities have formed the basis for the establishment of a strong Finnish biomass technology industry***

The Finnish government provides a high level of subsidy and support to research and development to develop an indigenous biomass technology industry. This has helped to create a strong domestic market and a thriving export industry, in particular in combustion technology, boilers and emissions control.

- ***Information, education and training: Active promotion of biomass energy through associations, agencies, etc.***

This includes the establishment of regional energy management agencies, working closely with national energy information centres. Finnish associations produce information material and innovative information dissemination schemes, especially in biomass (e.g. the Finnish Bioenergy Association, the Wood Energy Association). These associations also work closely with organisations in other Member States to make Finnish capabilities in biomass widely known. For example, Finnish biomass organisations have formed close links with similar organisations in Wales in the UK to transfer their know-how to encourage uptake of biomass use there.

France — Biofuels (biodiesel)

France is the largest producer of biofuels in Europe, accounting for 40 % of the total European production.

In 1993:	29.2 ktoe
In 1999:	279.3 ktoe
Increase 1993–99:	250.1 ktoe, 857 %

France is one of the few countries in the world to give a relatively high priority to the development of biofuels, mainly to support the agricultural sector and for research purposes.

For example, there are four plants producing biodiesel, a biofuel, in France. Oil companies can use this biodiesel as a substitute for normal fossil diesel, up to a level of 5 % for use in private cars. In professional fleets (company cars, buses, etc.) it can replace up to 30 %.

Success factors:

- ***Political: The French government supports a biofuels production programme***

The biofuel production programme is a financial scheme, operated at the national level, to develop investments for biofuel production.

- ***Fiscal: Biofuels benefit from advantageous fiscal measures***

In France, biofuels receive exemption from excise tax on petroleum products at the rate of FRF 2.30/litre (EUR 0.35/litre) of biodiesel and FRF 3.29/litre (EUR 0.50/litre) of ethanol in 2000. French fiscal aid to biodiesel, for example, was approximately EUR 120 million per year (FRF 0.8 billion), supporting 337 000 tonnes of oil equivalent. The excise tax exemption means that biofuels can compete cost effectively with fossil fuels.

- ***Technological development: French companies are world leaders in biodiesel production.***

The European leader for production and marketing of biodiesel is the French company Diester Industrie, with an annual turnover of EUR 200 million in 1997–98.

- ***Information, education, training: Biofuels are actively supported by local communities***

There is an information network among the various communities with an interest in biofuels: the oil companies (TOTALFINA, ELF) and vehicle manufacturers (PSA, Peugeot Citroen, Renault), professional and trade associations (Sofiproteol, NOVAOL), and national non-profit bodies (ADEME, the French Institute of Petroleum — IFT).

Over 30 local communities are working together as the association ‘Club des villes diester’ to promote use of biodiesel.

France — Biomass district heating

The biomass wood fuel market in France is one of the more successful examples of exploitation of renewable energy sources in the country over the past decade, with biomass used mostly for heating apartment blocks.

In 1993:	7.9 ktoe
In 1998:	16.9 ktoe
Increase 1993–98:	9.0 ktoe, 113 %

A number of examples of biomass heating applications can be seen in various regions around France:

- Dole, in the Jura Mountains in eastern France, has a 3.2-MW biomass-fired boiler delivering hot water and heating to 1 800 dwellings and various larger public and private buildings. This supplies more than one third of the energy required by the area, and uses 12 000 tonnes of wood residues annually.
- In Normandy, a 2-MW wood-fired boiler plant supplies heating to 470 houses, a college, a school and a sports centre. The project involved the construction of a heating network, which was developed by a heating company.
- In Bourgogne, a district heating system due for renovation was refurbished with an 8-MW wood-fuelled boiler. This provides heat for up to 3 500 homes, and also provides a market for waste wood from local sawmills.

Success factors:

- ***Political: Support for biomass energy through the biomass wood and local development plan***

This plan was implemented between 1995 and 1998 by the French state agency for the environment and energy conservation, ADEME. It covers both the development of the biomass wood fuel supply sector and the installation of new automated-feed, wood-fired boilers. The installation of 188 boiler houses in apartments and in the industrial and tertiary sector had been achieved by 1999.

- ***Financial: Support provided towards the development of projects***

Support for the development of district heating plants is available in the form of investment subsidies from the local region, while an additional subsidy may be available through EU or national funds.

- In the Dole system, about one third of the funding required was provided from ADEME with further contributions from the regional authority and other regional economic development funds.
- In Bourgogne, support was received from ADEME, the regional council and the EU.
- In Normandy, the heating company received financial support from the regional authority together with an agreed contract to operate the plant over a 24-year period.

France — Wind energy

Wind energy use in France expanded 10-fold between 1993 and 1999, but the level of penetration remained low.

In 1993:	3.5 GWh
In 1999:	36.0 GWh
Increase 1993–99:	32.5 GWh, 928 %

Most French wind energy developments are small installations in isolated or remote regions, particularly islands such as Corsica, or in French overseas departments.

A smaller number of wind installations have been established on the mainland. One example is the series of wind farms that has been developed around Dunkirk over the past 10 years. A first wind turbine, part-funded by the European Community, was commissioned in 1991, and this was followed in 1996 by a wind farm with nine turbines totalling 2.7 MW. Most recently, in 1999, near Dunkirk in Wideheim, a new development was started which comprises six 750-kW turbines, totalling 4.5 MW.

In France, wind energy was supported during the period examined through the competitive tendering system Eole, established in 1996. The process was implemented in stages: the first stage to contract 15 MW, the next to contract 35 MW and finally to achieve a total capacity of 250–500 MW by 2005. Eole was a similar system to the Non-Fossil Fuel Obligation used in England and Wales: requests for proposals were invited from developers for a certain amount of capacity and successful tenders received a guaranteed market for 15 years at the bidding price for their wind-generated electricity. Tariffs available for the first stage were FRF 0.38/kWh (EUR 0.058/kWh), which fell by about 10 % in further bidding stages.

The progress of project implementation was, however, slow. Despite acceptance under the Eole system, developers still encountered barriers to project implementation (see below).

Until recently there have been few fiscal or financial incentives in support of wind energy developments outside the Eole system. The earliest wind turbine at Dunkirk received EU funding support (50 %), but was developed prior to the Eole system. The Regional Council of Nord-pas-de-Calais contributed a 53 % share in the subsequent wind farm constructed in 1996, while additional financing was received from ADEME (the French national energy agency), Eléctricité de France (EdF) and EU Structural Funds.

Wind energy developments in France have been hampered by the difficulties encountered when attempting to obtain connection to the grid. There are no guaranteed access rights for small generators.

This case study illustrates how the lack of a guaranteed market through access to the grid and the limited availability of financial support can restrict the more widespread uptake of renewable energy technologies. The success of Dunkirk and Wideheim is mainly attributable to the foresight and determination of the developers and the municipalities to achieve successful wind farms. For example, the municipality of Dunkirk worked with the developer to stimulate the establishment of the first wind turbine, with the mayor giving his full support to the project. For the second wind project, the municipality of Dunkirk again played a vital role, promoting the project, selecting and making available the site, participating in its financing and encouraging the Regional Council also to participate.

One result of the first two wind power developments in Dunkirk is that the most recent wind farm (1999) in Wideheim has French-constructed innovative turbines.

Since June 2001 France has replaced the Eole competitive tendering system with a feed-in tariff system. Wind energy producers receive on average FRF 0.46/kWh (EUR 0.070/kWh) depending on real wind speed on the site.

Germany — Biomass power

Germany has seen a steady increase in the development of wood-fuelled combined heat and power plants, especially in the more forested southern regions of the country such as Bavaria.

In 1993:	419.0 GWh
In 1999:	677.0 GWh
Increase 1993–99:	258.0 GWh, 61 %

After the success of the Electricity Feed-in Law in increasing renewable electricity from wind, renewable energy promotion is now shifting towards the direct use of biomass and the use of biomass for power and for heat production.

Bavaria is the largest of the German *Länder*, with about 35 % of its surface area forested, the highest density in Germany. Wood is used for heat and increasingly for power production. The use of wood for heating purposes is common in the region: almost one third of Bavarian homes use wood as an energy source. There are nearly 100 biomass-fuelled district heating systems installed, including 16 combined heat and power (CHP) plants. These plants consume both wood and straw. Bavarian examples of CHP plants include the following:

- Since 1995, a biomass CHP plant has been operating near Sulzbach-Rosenberg. The plant generates 4.2 MW electricity and 16.8 MW heat. Part of the steam produced is used in the nearby steel works, and more steam is distributed for use in the city's district heating network, supplying nearly 1 000 homes. Fuel comes from a farmers' association, which provides a variety of biomass fuels, including straw, wood chips and wood residues.
- A CHP plant generating 15 MW electricity and 75 MW heat provides steam and electricity to a chipboard manufacturing factory in Neumarkt. The plant burns waste wood (sawdust and chippings) and forestry wastes.
- A biomass-fired CHP plant generating 12 MW electricity and 35 MW heat has been established in Altenstadt; it supplies power to the grid and heat to the neighbouring district heating network.

Success factors:

- ***Political: National and in particular regional government support towards increasing use of biomass***

German energy policy is closely linked with national policies to support climate protection. Renewable energy plays an important part in this policy, and the government has actively supported financial provision towards renewables, both at national and regional level. Most German regions also have energy policies, targets and support mechanisms designed to encourage the development of renewable energy. For example, the Bavarian government aims to increase the share of renewable energy use to 13 %, up from the present level of 9 % of gross inland energy consumption. Of this, the biomass contribution is expected to provide between 3 and 5 %.

- ***Legislative: Premium-set tariffs combined with an obligation to purchase provide a stable market for renewable electricity producers***

Through the Electricity Feed-In Law there is a guaranteed market and fixed price for the electricity produced from renewable energy sources, including biomass. More recently, biomass power has been one of the main beneficiaries of the revised feed-in law, which was implemented in April 2000 and provides more economically attractive tariffs for biomass power.

- ***Financial: Some grants available for biomass installations***

Grants for investment in biomass power are limited and include capital subsidies from the federal government and low-interest loans from a public bank, the Deutche Ausgleichbank.

- ***Technological development: Strong indigenous industry capabilities in biomass***

Research and development (R&D) support has resulted in the establishment of a strong indigenous capability that benefits from a vibrant domestic market.

Since the 1970s, a considerable amount of R&D has been carried out into biomass harvesting, fuel processing and combustion equipment. R&D support has gone to technological developments in wood pelleting systems and new small-scale biomass gasification or CHP biomass utilisation systems. The use of alternative biomass fuels such as straw and other agricultural residues has also been encouraged.

There is a requirement to guarantee good performance levels and expertise to obtain state investment subsidies; this ensures that the overall quality of installations is high.

- ***Information, education, training: Promotion of opportunities from renewable energy use through specialist municipal advice centres***

Specialist municipal advice centres provide information on the use of renewable energies, such as biomass. In Bavaria the regional centre for research into agricultural engineering provides an information resource centre to technical and general public to promote the opportunities from biomass use.

Greece — Solar thermal

Greece has the highest per capita use of solar thermal technologies in the EU.

In 1993:	92.5 ktoe
In 1999:	124.4 ktoe
Increase 1993–99:	31.9 ktoe, 34 %

Solar collectors have been widely installed throughout Greece since the 1980s. There are a number of factors that make solar thermal technologies attractive for providing an increasing proportion of Greece's energy needs, including the country's favourable climate. There is no district heating tradition in Greece, so typical water-heating systems in households are electricity based, and electricity prices are relatively high compared to the Greek household disposable income.

The island of Crete is one area of Greece that has carried out extensive studies and activities to develop its indigenous renewable energy resources. There has been a high take-up of solar thermal collectors among the population, both for domestic dwellings and in the hotel and tourism sector. To date, about 20 % of Crete households have solar collectors. These are mostly produced and installed by local companies, and supply cost-effective and reliable hot water.

Success factors:

- ***Political: Support policies for renewable energy use***

Various policies and legislation to support uptake of renewable energy, including solar thermal technologies, have been implemented since 1990. The Operational Programme for Energy, which ran from 1994 to 1999, provided a total of EUR 140 million of public, EU and private funds for renewable energy development.

Crete benefited from this programme through targeted support for renewable energy technology development. Crete adopted an energy policy in 1994 that placed a high importance on the use of renewable energy, and the implementation plan was finalised by the regional energy agency in 1999.

Greece's new Operational Programme for Energy, which began in 2000, supports tax exemptions, loans and third-party financing for renewable energy and energy efficiency in the building sector.

- ***Financial: Grants and loans available***

In the early stages of their development, in the late 1970s and early 1980s, the use of solar water-heating systems was stimulated through subsidies. From 1990, Law 1892 provided subsidies up to 45 %–55 % (depending on location) for the promotion of various investments including in renewable energies. Hotels which invested in solar water heaters benefited considerably from this law.

- ***Fiscal: Tax exemptions to individuals for buying renewable appliances***

Since 1995 Law 2364 has provided tax exemptions to households buying renewable appliances, such as solar water heaters; 75 % of the purchase value of a renewable appliance is deducted from a person's taxable income.

- ***Technological development: Strong domestic manufacturing industry***

The financial support given in the late 1970s and early 1980s to promote the use of solar water heaters created an opportunity, and a market, for the emergence and establishment of a local industry which developed over the 1980s and reached maturity in the early 1990s. Local industry was an important driving force in solar thermal expansion in Greece.

Ireland — Wind energy

Ireland's exploitation of its wind resource has seen a 12-fold increase in wind energy generation in the six years since 1993 but from a low starting point.

In 1993:	15.1 GWh
In 1999:	187.0 GWh
Increase 1993–99:	171.9 GWh, 1 138 %

Ireland has few indigenous energy resources and therefore relies heavily on imported fuels. Wind exploitation offers a good opportunity for reducing fuel imports and making a significant contribution towards the country's electricity supply. Indeed, most of future renewable energy development in Ireland is expected to come from wind energy. However, some Irish developers are encountering a number of problems in obtaining planning permission for new wind farm developments. The Irish Renewable Energy Information Office provides an advice service to ensure that developers and planners receive adequate information and support to reach balanced decisions on renewable energy projects.

Kilronan wind farm is one example of a wind energy development in Ireland. It was developed by the Irish company Kilronan Wind Farm Limited. The excellent wind resource in the region (County Roscommon), together with existing access roads and power lines to the nearby local coal mines, made Kilronan the ideal location for a wind farm. It was built in 1997 and comprises 10 turbines, each of 0.5 MW. In 1998, the wind farm generated 14 GWh of electricity.

Success factors:

- ***Political: National Sustainable Development Strategy provides a framework for renewable energy development***

Irish energy policy focuses on increasing its use of indigenous energy sources. Renewable energy can contribute towards this policy, and can also provide opportunities for rural development. In 1995 the government set a target of increasing electricity generated from renewable sources by 55 MW, from 235 MW to 290 MW. The target was achieved and extended through the 1999 White Paper on sustainable energy. This increased the target for electricity generation from renewable energy to 500 MW in the period 2000–05.

- ***Legislative: The Alternative Energy Requirement (AER) provides support for renewable energy generation, through a competitive tendering mechanism***

The main support mechanism for renewable energy is the Alternative Energy Requirement (AER). This is comparable to the NFFO system in operation in the UK. It is a competitive bidding system for different renewable energy technologies. Successful developers obtain a 15-year guaranteed purchase of their power, at the project's bid price. Four AER bidding rounds have been held since 1994. Since this date, almost all new wind capacity has been achieved through AER contracts. By 1999, 10 wind farms with AER contracts were connected to the grid, totalling 63 MW, with up to 137 MW further new capacity planned.

- ***Fiscal: Some fiscal support to renewables***

Limited fiscal support is available through tax relief for corporations making investments in renewable energy projects.

- **Financial: Capital grants are available for projects and for regional evaluations of wind energy resources**

Winning bidders to the AER can apply for a capital grant, supported through EU Structural Funds. A number of projects have also received support from the EU Thermie programme for demonstration projects.

Through the Business Expansion Scheme companies can access cheaper finance than is typically available from commercial banks.

- ***Technological development***

There is little indigenous manufacturing of renewable energy equipment, and the opportunities for developing such an industry are limited to newer long-term technologies such as wave power, and in-site assessment activities. Investigations of Irish wind resources are actively supported, such as through the development of the Irish wind atlas by University College Dublin, RISOE (a Danish/United Nations Environmental Programme research institute) and others. Financial support has also been provided towards implementation of renewable energy feasibility studies.

- ***Information, education and training: Government support for information on renewable energy***

The Renewable Energy Information Office (REIO) of the Irish Energy Centre was set up in 1995 to promote the use of renewable energy resources and to provide independent advice and information on financial, social, environmental and technical issues relating to renewable energy development. It also provides advice to the public on all aspects of renewable energy. REIO has played a leading role in identifying and addressing issues such as financing and planning, which are crucial to the successful development and deployment of renewable energy technologies. The Office is also charged with the task of disseminating the results of successful applications of renewable energy technologies. By providing ready, centralised access to such information, REIO helps reduce the cost to developers of assessing new technologies and deployment strategies. This in turn stimulates replication of successful projects which then increases market confidence. In particular the government aims to encourage smaller-scale developments of renewables in projects that can achieve local benefits. Kilronan, for example, is a local scheme helping to revitalise an old coal-mining area.

Italy — Wind energy

Italy's exploitation of its wind resource has been slow to take off, but its level of penetration is now rapidly expanding, especially in southern regions.

In 1993:	4.4 GWh
In 1999:	403.0 GWh
Increase 1993–99:	398.6 GWh, 9 059 %

Because of its location, in the closed Mediterranean, Italy's wind resources are not as great as those in some other parts of Europe. Nevertheless, there is still potential, especially in the Apennines Mountains above about 1 000 m, and in other locations in southern Italy.

Since the latter half of the 1990s, the Italian Vento Power Corporation (IVPC) has been active in developing a series of wind energy projects in southern Italy. IVPC linked with foreign trading partners, already involved in other wind projects around Europe, to obtain financial support for its venture. The company has now constructed wind farms at five sites, with further expansion expected. Total installed capacity is now almost 400 MW.

One of the most difficult and expensive aspects of establishing wind energy schemes in Italy can be arranging grid connections. In some regions, the existing grid infrastructure is poor (as is the case in southern Italy), and it is expensive to upgrade the grid sufficiently for it to be able to accept power from the new wind farm. In such cases, developers like IVPC often have to contribute substantially towards the connection costs of the grid operator.

In addition, obtaining permission to construct can be very lengthy — up to two years — because of the large number of permits that may be needed and a lack of clarity over the conditions that the project needs to meet.

Success factors:

- ***Political: Enhanced political support for renewable energy is boosting opportunities for wind energy developments***

Italian energy policy aims to reduce energy import dependency and to reduce greenhouse gas emissions. Italy has implemented a series of national energy plans since the 1980s. The National Energy Plan (1988) focused on objectives and targets to 2000, including implementation of policies on energy savings, renewable energy and environmental protection. However, only limited uptake of renewable energy was achieved under these policies. New legislation in 1998–99 included aims for developing renewable energy sources to 2010 (from 11.7 mtoe in 1997 to 20.3 mtoe in 2010), based around a White Paper on renewable energy sources. The accompanying national energy programme requires regions to make regional energy plans, including policies to increase energy efficiency and to develop renewable energy, such as wind power. Nationally, new aims for wind energy uptake are identified as 700 MW by 2002, doubling to 1 400 MW by 2006.

- ***Legislative: Premium-set tariffs combined with an obligation to purchase provide a stable, commercially favourable market for renewable electricity producers***

A tariff system was established in 1992. The grid operator is obliged to purchase all electricity from renewable sources, at an agreed premium rate for the first eight years of electricity production, and at guaranteed minimum rates for the remainder of the project's life.

The IVPC wind farms typically have a 15-year contract with the grid operator, which provides a premium payment for electricity output during the first eight years at ITL 202.4/kWh (EUR 0.105/kWh), after which the rate drops by about half.

Early tariff structures were complex and provided different rates for different energy sources and different times of day. Since 1992 these tariff structures have been progressively revised and simplified. In general, feed-in tariffs consist of a supplement towards the avoided costs and the higher investment costs of renewable generation compared with power from conventional sources, and apply for the first eight years.

- ***Fiscal: Some support available to renewable energy projects***

Investment in wind energy (as well as in photovoltaics power) benefits from a 10 % discount on value added tax. Investment in poorer southern regions in Italy benefits from 10-year corporation tax breaks.

Funds for the financial support of renewable energy are now collected via a new carbon dioxide tax, approved in 1998. Over EUR 1.6 million were expected to be available in the first year.

Netherlands — Photovoltaics

Use of photovoltaics in the Netherlands has expanded steadily since 1993, mainly in small-scale and off-grid applications. A large number of grid-connected projects have also been established, and more are being developed to meet new and more ambitious national targets for PV use.

In 1993:	0.7 GWh
In 1999:	6.0 GWh
Increase 1993–99:	5.3 GWh, 757 %

Dutch businesses have been market leaders in the photovoltaics (PV) industry since the late 1980s and in particular have developed a thriving export industry. A small number of PV installations were developed in the Netherlands during the early 1990s. The Barendrecht project is an early example of a grid-connected PV installation. It was conceived in 1993 and became operational in 1996. It consists of 12 grid-connected, roof-integrated PV systems in newly built houses, with a project life in excess of 20 years. Both stand-alone and grid-connected systems have since been developed: by the end of 1998 there was an installed capacity of 5 MW of PV installations and manufacturing production of 100 000 m^2 of PV panels.

Success factors:

- ***Political: More ambitious national targets have recently been established for renewable energy use***

The main driving force for encouraging renewable energy uptake in the Netherlands has been the 1997 White Paper on renewable energy. This set a target for penetration of renewable energy, subsueqently updated to 5 % of the country's gross inland energy consumption by 2010 and 10 % by 2020.

These targets and associated initiatives were not available at the time the Barendrecht project was initiated, and represent an ambitious increase compared with the levels of use of renewable energy at the time (only about 1 % in the early 1990s). Nevertheless, the Barendrecht and other earlier PV installations benefited from a range of measures that benefited renewable energy developments.

- ***Legislative: Electricity supply companies are obliged to purchase power from independent power producers***

Energy policy in the Netherlands during the 1990s has built on the foundations laid by the 1989 Electricity Act, which obliged electricity supply companies to purchase and distribute electricity produced by independent power producers, such as renewable power producers.

Individual householders at Barendrecht can therefore sell power surplus to their domestic requirements to the utility. The utility buys at around NLG 0.23/kWh (EUR 0.13/kWh), which is equivalent to the price the owner would pay for conventional electricity provided from the utility. Prices are negotiated per project, however, and recent developments have now led to an average price of NLG 0.16/kWh (EUR 0.07/kWh) across the country.

Some distribution companies also accept net metering: a household's meter is allowed to run backwards as compensation for feeding the surplus electricity into the grid.

- ***Fiscal: Tax structure is favourable towards renewable energy***

A regulatory energy tax (also applicable to electricity) has been in operation since 1995. This is levied on households and small and medium-sized industry; in 1999 the rate was about EUR 0.026/kWh (electricity) and EUR 0.019/m^3 (gas). Renewable energy is exempted from the tax.

Companies and firms which invest in energy-saving projects (including renewable energy) can be exempted from taxation, and can benefit from claiming accelerated depreciation of investment in energy conservation equipment including PV systems. Individuals benefit from income tax exemption for investments in 'green' funds.

- ***Financial: Subsidies are available for renewable energy schemes, both from public and private sources (including utilities)***

Subsidies are available both from NOVEM (the Netherlands' energy and environment agency) and from local authorities to support energy-efficient technologies, including renewable energies. In addition, utilities are obliged to invest in energy conservation or renewable energy schemes, with the result that many utilities own and operate renewable energy projects such as PV installations.

At Barendrecht, the local municipality and a private property developer initiated the project. The owners of the scheme are the homeowners themselves, although financing was provided in partnership with other local and national players, and from the utility. The owner of the house is obliged to keep the PV system for 10 years, and a contract is signed between the owner, the municipality and the utility. The system is guaranteed for 10 years after the completion date.

The Netherlands also has a number of domestic banks (e.g. Triodos) which are supportive of environmental and community initiatives, including renewable energy schemes, and are willing to invest small amounts of finance towards these kinds of projects at favourable rates.

- ***Administration: Municipal authorities are responsible for implementing spatial planning, including location of renewable energy systems***

The planning process addresses the removal of any barriers to maximising solar energy production in residential buildings.

- ***Technological development: Strong market development programme under way***

During the 1990s NOVEM had a strong research and demonstration support programme, assisting government research organisations and industry to develop an indigenous PV industry. Fundamental and applied research is carried out by universities and research centres, to improve cell efficiency, to investigate new market applications (both on- and off-grid), and to develop guarantees ensuring that Dutch PV products are high quality and operate to a good performance level. There is also an indigenous PV cell manufacturing capability, which by the end of 1998 was producing more than 100 000 m^2 of PV panels.

Portugal — Wind energy

Wind energy has been slow to develop, but is starting to show promise.

1993:	11.0 GWh
1999:	123.0 GWh
Increase 1993–99:	112.0 GWh, 1 018 %

Enernova is a subsidiary of Electricidade de Portugal (EDP) which was established to explore the wind energy potential in Portugal, and to develop the technology in the country. It was the main driving force behind implementation of wind energy schemes during the mid-1990s.

A number of wind projects were established on Portuguese islands such as Madeira in the early part of the 1990s, but the first mainland wind scheme was built in 1996. This consisted of 17 600-kW machines, totalling 10.2 MW. A second project was built soon afterwards, with a total 10-MW electrical capacity, and further schemes have followed.

The country does not have large areas with strong and predictable wind resources, but despite this a number of suitable sites have been identified through a detailed evaluation of wind resources and the subsequent development of a wind atlas of Portugal. This, combined with the increasing availability of finance for wind developments and an improvement in tariffs paid to renewable electricity producers, has led to a surge in new projects recently. However, one of the limitations to development of wind energy in Portugal is the quality of the grid infrastructure, which can result in complex and expensive connections.

Success factors:

- ***Political: National energy programme established in support of renewable energy development***

The Portuguese Energy Programme was established in 1994 with the aim of reducing dependence on energy imports, providing reliable energy supply at a reasonable cost, encouraging energy efficiency and increasing the use of renewable energies. Regional energy plans have followed, promoting renewable energy and energy-efficiency initiatives.

- ***Legislative: Premium-set tariffs combined with an obligation to purchase provide a stable, commercially favourable market for renewable electricity producers***

Since 1988 independent producers using renewable energy sources or combined heat and power have had guaranteed access to the grid at regulated prices (Decree 189/88 on independent power production). This provided a guaranteed feed-in tariff for electricity generation from renewable energy for eight years. Despite this, few wind projects came forward until financial support and tariff levels for new renewable electricity were improved in 1995 when Decree 313/95 was introduced.

Since 1999, a new feed-in law (Decree 168/99) has been implemented that provides more favourable tariffs for renewable energy, by taking account of the environmental benefits of using indigenous, non-fossil sources compared with fossil fuels, and ensuring guaranteed purchase of power from renewable generators.

- ***Financial: Generation incentives for independent power producers***

The Portuguese Energy Programme in 1994 introduced financial incentives for independent electricity producers. These differ depending on the nature of the project, its size and its geographical location. Grants were available of up to 60 % of eligible costs for demonstration projects, or up to 50 % for dissemination (commercialisation) projects. Zero-interest loans were also available for up to 40 % of project costs for commercial projects. After 1997, this loan level was raised to 60 % of project costs. The Programme was funded by the European Community (Structural Funds), the Portuguese government and private investors.

More recently the government has provided finance towards grid connection costs.

- ***Information, education and training: Regional evaluations of wind energy resources are available***

A great deal of work was carried out during the early 1990s to develop a wind atlas of Portugal. The Portuguese government makes information on subsidies for renewable energy projects and how to apply for them available to the public.

Spain — Biomass power

Biomass is an important renewable energy resource in Spain, and its use is continuing to expand rapidly, especially for power generation projects.

1993:	485.0 GWh
1999:	917.0 GWh
Increase 1993–99:	432.0 GWh, 89 %

Spain possesses large amounts of readily exploitable biomass resources. The household sector and various industrial sectors (pulp and paper, timber, etc.) are currently the biggest users of biomass, for thermal purposes. However, the use of biomass in power generation (including combined heat and power) is expanding rapidly. Much of this expansion is due to a combination of factors: the existence of a guaranteed market for the electricity produced at favourable rates, the availability of capital subsidies and the high level of interest shown in developing large and medium-sized biomass heat or power plants, using a variety of biomass sources as fuels.

One of the leading developers of biomass projects is ENDESA, part of a major Spanish utility. Projects include two combined heat and power plants, each generating 16 MW of electricity, fuelled by olive oil residues.

Other biomass residues used in Spain as fuel include grape/wine residues, rice husks, wood wastes and wood residues. There is also an interest in developing energy crops such as poplars or eucalyptus to fuel biomass plants, and pilot plants are being established to demonstrate the use of these fuels for energy recovery.

Success factors:

- ***Political: Strong support for renewable energy implementation at both national and regional level***

Spain actively supports the development of renewable energy, particularly for its environmental benefits and its contribution to security of supply. The national Energy Saving and Efficiency Plan (PAEE), 1991–2000, aimed to increase the overall use of renewables by 1.1 mtoe by the year 2000, including an increase in the contribution of non-hydro renewables in electricity generation from 0.5 % in 1990 to 1.4 % in 2000. The Plan de Fomento de las Energías Renovables (2000–10) set a new target of a 12 % share for renewables in gross inland energy consumption by 2010. Biomass, and increasingly power from biomass, will be key in meeting this target.

Each of the Spanish autonomous regions has a regional energy plan, focusing on developing environmentally and economically sustainable energy provision, and containing objectives and targets for the promotion and implementation of renewable energy sources.

- ***Legislative: Premium-set tariffs combined with an obligation to purchase provide a stable, commercially favourable market for renewable electricity producers***

The main driving force for support to renewable energy comes from a series of royal decrees during the 1990s on support for electricity generation from renewable energy sources, wastes and combined heat and power. The decrees guarantee the purchase of electricity from renewable sources at a premium fixed price, at 80–90 % of the average electricity tariff from conventional power sources. From 1999, electricity producers (including biomass) can receive either the fixed tariff of up to ESP 10.24/kWh (EUR 0.06/kWh) or can receive the average hourly market price of electricity plus a bonus of up to ESP 4.61/kWh (EUR 0.03/kWh). The legislation also provides for guaranteed access to the electricity grid, with agreed rates for connection.

- ***Financial: State and regional subsidies available***

The PAEE provided limited (20 %) subsidies in the form of capital grants. However, the uptake of biomass projects was slower than anticipated and so capital subsidies for biomass projects were strengthened from 1996 to reach up to 30 % of eligible costs, with a further

10 % for projects developed by small and medium-sized enterprises. Each autonomous region can provide separate additional support for investment and project financing.

- ***Administration: Local involvement in renewable energy planning***

Responsibility for renewable energy sources belongs chiefly to the autonomous communities (the regions). This allows each region to have authority over the various administrative procedures and over planning provisions to implement renewable energy projects. These responsibilities are closely linked with environmental obligations, and in particular with the requirements to provide environmental impact assessments for new projects.

Successful implementation of biomass projects is mostly met where collaboration at all levels of administration (local, regional and national) is achieved.

Sweden — Biomass power

Sweden has a long history of producing energy from its forestry resources, and biomass-based electricity, including combined heat and power, is increasing steadily.

Penetration:	
In 1993:	2 113.0 GWh
In 1999:	3 011.0 GWh
Increase 1993–99:	898.0 GWh, 42 %

Sweden is a world leader in the production and conversion to power of solid biomass. Most of the biomass power comes from combined heat and power (CHP) plants. In Sweden there are vast areas of forest, the fiscal system favours renewable energies and a great deal of financial and research support has been provided to biomass for a number of years. All these greatly helped biomass energy to develop as an important source of fuel for power plants. Biomass as a fuel source for CHP increased steadily during the 1990s, and particularly in recent years, and biomass power now meets about 2.5 % of Sweden's electricity needs.

Success factors:

- ***Political: Support for renewable energy use, especially biomass***

The overall objective of Sweden's energy policy is to secure the long- and short-term energy supply on economically competitive terms, with an emphasis on sustainable development. Sweden has a policy to prevent an increase in CO_2 emissions, and it has also made commitments to phase out its nuclear generation capacity.

Long-term support for research and development into new and renewable energy technologies, and a greater use of renewable energy are the two principal means of achieving these aims. Biomass especially plays a vital role. Sweden has a policy objective to replace electric domestic heating with CHP or district heating systems, especially making use of biomass for fuel.

- ***Legislative: Electricity supply companies are obliged to purchase power from small-scale power producers***

The liberalisation of the Swedish electricity market provides straightforward access for small independent generators to be connected to the grid. Swedish utilities were obliged to purchase electricity generated from small generators, at agreed prices. Since the last quarter of 1998, biomass power has been sold at the market price plus a temporary support of SEK 0.09/kWh (EUR 0.009/kWh) provided by the state. Small generators can also obtain discounts from grid-use costs.

- ***Financial: Subsidies available to renewable energy schemes***

Investment grants are available for biomass-fired combined heat and power plants up to 25 % of total investment, which translates to a maximum of SEK 3 000/kWh (EUR 330/kWh) of electricity capacity installed. Since 1998 there has also been a technology procurement programme for renewable energy production, and biomass power projects can benefit from it. Since the last quarter of 1998, biomass power has also benefited from a temporary price support as noted in the legislative section.

- ***Fiscal: Energy tax systems benefit biomass use***

Biomass is exempted from the energy tax, the carbon dioxide tax and the sulphur oxides tax. The carbon dioxide and energy taxes have helped to change the economics of new power generation and have made coal-fired CHP plants more expensive than any other option. A number of public coal-fired CHP plants have changed to fire biomass due to the introduction of the carbon dioxide and energy taxes.

Small generators are exempt from a nitrous oxide levy, which applies to generators over 25 GWh/year. The exemption applies to small generation from all fuels, not only biomass.

- ***Technological development: Active development and promotion of biomass technologies***

Swedish research and development actively supports technological developments in renewable energy. Biomass research, development and demonstration receive total funding of about SEK 400 million (EUR 36 million) per year from the government. Electricity companies and other industries also provide funds. The main areas of support are combustion and conversion technologies, demonstration of pre-competitive technologies, fuel production, harvesting supply programmes and ashes recycling.

- ***Information, education and training: Long history of use of biomass as fuel, benefits to key local economic actors from biomass projects***

Biomass use is well established and accepted in Sweden. Farmers and forest companies are supportive of new biomass projects because of the additional income the project will generate for them. Wood users such as sawmills also benefit because they have an additional market for their wood wastes. These actors, in particular the farmers' cooperatives, have helped to gain increasing public acceptance of biomass projects. Most important, there is a high level of environmental awareness in Sweden, particularly in renewable energies as an alternative to other energy sources, and this has often been the main force behind developing renewable energy schemes, such as biomass.

Sweden — Wind energy

Sweden's use of renewable energy has focused on its hydro-power and biomass resources, but it has now started to expand its use of wind.

In 1993:	51.7 GWh
In 1999:	371.0 GWh
Increase 1993–99:	319.3 GWh, 618 %

The Swedish potential for wind power is large. However, some of this is in coastal areas where wind energy development competes with other interests over land use. The size of installations has expanded considerably, and by 1999 there were 486 turbines with a total installed capacity of 220 MW.

Cooperative wind power development in Sweden has been successful. One example is an early wind power scheme (Holmbod) developed by the Vindkompaniet Swedish wind power cooperative in Gotland. This scheme comprises one 500-kW turbine connected to the grid. By the end of 1998, Vindkompaniet had installed over 80 turbines, in a variety of wind farms. Due to the success of companies such as Vindkompaniet, more than 10 % of the domestic electrical consumption in the region of Gotland is now provided by wind power.

Many of these early wind power schemes have a high level of community involvement, often being cooperatively owned by citizens living nearby. However, as the market for cooperative schemes is reaching saturation point in the windiest districts of the country, there may be fewer opportunities for further replication of the cooperative scheme involving neighbouring inhabitants. The developer is now receiving more interest from farmers and utilities than from communities, but there is also interest in cooperatives owned by citizens living across the country and not in the proximity of the project.

Success factors:

- ***Political: Support for renewable energy***

Swedish energy policy aims to secure the country's long and short-term energy supply on economically competitive terms, with an emphasis on sustainable development. In particular, the policy during the 1990s concentrated on restructuring the energy system. There were two main areas of focus. The first was to provide support for long-term research and development into new and renewable energy technologies. The second area consisted of shorter-term initiatives to address the replacement of electricity from nuclear energy when nuclear plants are closed, through support for renewable energy, energy efficiency and district heating.

- ***Legislative: Electricity supply companies are obliged to purchase power from independent power producers***

The liberalisation of the Swedish electricity market provides straightforward access for small independent generators to be connected to the grid. All Swedish regional distribution utilities were obliged to purchase electricity from small generators, at agreed prices. Small generators such as the Holmbod scheme in Gotland can obtain discounts or exemptions from grid-use costs, although they have to pay an agreed one-off connection charge and annual grid connection fees. Since the last quarter of 1998, wind power has been sold at the market price plus a temporary support of SEK 0.09/kWh (EUR 0.009/kWh) provided by the state.

- ***Fiscal: Tax structure is favourable towards renewable energy***

Electricity production from small-scale renewable energy projects is favoured by lower or non-energy taxation (Act 1994:1776). For smaller and cooperative schemes, Swedish citizens are eligible for an income tax allowance of up to 15 % on new investments in renewable energy schemes. Furthermore, for cooperative operations, no income tax is payable on the share dividends up to the cost of the shareholder's normal electricity costs. This encourages investment in renewable energy schemes.

- ***Financial: Subsidies available to renewable energy schemes***

Investment grants were available for wind power schemes up to 35 % for wind turbines with a capacity bigger than 60 kW. (Holmbod wind farm received a grant of 35 % of the project's development costs.) Since July 1997 investment grants have been revised downwards: up to 15 % for wind turbines bigger than 200 kW.

Wind energy schemes benefit from an 'environmental bonus' equal to the excise tax on electricity. The environmental bonus has been on average a little over EUR 0.01/kWh of electricity generated. Since the last quarter of 1998, wind power schemes have also benefited from a temporary price support, as noted in the legislative section.

- ***Administration: Planning support for new wind energy developments***

Some regional planning authorities designate areas as 'suitable for wind energy production'. For Holmbod, planning was proposed and implemented at the local level by the local council. The regional planning authority instigated a detailed study of wind energy in the region. This study was used by the developer to identify a suitable site in the area. No problems were experienced in obtaining planning permission for the installation of the Holmbod turbine in Gotland.

- ***Information, education and training: Active local interest in wind energy developments***

There is a high level of consciousness about environmental issues in Sweden and this has often been the main motive for developing renewable energy schemes. The entrepreneurial spirit found among many of the population and Sweden's cooperative tradition have helped to create a favourable environment for developing renewable energy. By 1998, Swedish citizens had invested about EUR 20 million in wind. Many of these investments are in cooperatives: there are about 50 already. Farmers are becoming increasingly aware of the financial opportunities, through land rentals or electricity sales, of investing in wind energy.

Vindkompaniet involved the local population in discussions at an early stage of the Holmbod project development.